Cu/Cu oxide growth on ZnO and TiO2 for CO2 reduction
FEI WANG, ZIYU ZHANG, RICHARD KURTZ, PHILLIP SPRUNGER, Louisiana State University — Monolayer copper growth on ZnO(10-10) and TiO2(110) have been studied with STM, EELS and LEED. These systems are attractive due to their photochemical and electrochemical reduction of CO2. However, determination of the particular reaction pathway(s) has been elusive because final reduction products strongly depend on the coverage and size of Cu clusters. In order to detangle substrate effects, single crystal ZnO(10-10) and TiO2(110) have been chosen as supports for Cu growth. STM is employed to investigate the nucleation and growth of Cu on both substrates. Cu tends to grow nanoclusters on both substrates with preferred nucleation sites and directions. Upon annealing, Cu clusters ripening have been seen on ZnO substrate but not on TiO2. Subsequent oxidation of Cu clusters is also studied with STM. CO2 vibrational modes on both substrates will be studied with EELS.

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